

Central Valley Regional Water Quality Control Board

Meeting Summary
FOOD SAFETY EXPERT PANEL
PUBLIC MEETING

April 21, 2017
10 a.m to 3 p.m.

Attendees

Panel Member	Title & Affiliation
Dr. Stephen Beam	Branch Chief, California Department of Food Agriculture (CDFA)
Dr. Andrew Gordus	Staff Toxicologist, Department of Fish and Wildlife (DFW)
Dr. Seth Shonkoff	Executive Director, PSE Healthy Energy; Visiting Scholar, Environmental Science, Policy and Management, UC Berkeley; Lawrence Berkeley National Laboratory (LBNL), Energy Technologies Area
Dr. Barbara Petersen (by phone)	Principal Scientist, Chemical Regulation and Food Safety, Exponent
Dr. Bruce Macler	Toxicologist, U.S. Environmental Protection Agency (EPA)
Mark Jones	Toxicologist, US Army Corp of Engineers
Dr. David Mazzera	Branch Chief, California Department of Public Health
Dr. Ken Kloc	Staff Toxicologist, California Office of Environmental Health Hazards Assessment

Affiliated Parties	Title & Affiliation
Dr. Karl Longley	Chair, Central Valley Regional Water Quality Control Board (Water Board)
Stephanie Yu	Office of Chief Counsel, Water Board
Clay Rodgers	Assistance Executive Officer, Water Board
W. Dale Harvey	Supervising Engineer, Water Board
Josh Mahoney	Water Resource Control Engineer, Water Board
Rebecca T. Asami	Engineering-Geologist, Water Board
Dr. William Stringfellow	Science/Technical Advisor, University of the Pacific, LBNL
Dave Ceppos	Associate Director, Center for Collaborative Policy (CCP)
Alex Cole-Weiss	Assistant Facilitator, CCP

Note: Panel member Patrick Kennelly retired from the Panel in March 2017 and was replaced by Dr. David Mazzera. Dr. William Stringfellow resigned from the Panel in February 2017 to contract as a technical/science advisor to the Water Board. Dr. Klen Kloc joined the Panel in March 2017. Panel members Dr. Seth Shonkoff and Mark Jones were able to attend the afternoon part of the meeting only. Panel member Dr. Gabrielle Ludwig and Water Board member Raji Brar were unable to attend the meeting.

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Action Items

1. **Water Board staff** to determine when literature review will be completed. Meeting to take place during week of April 24.
2. **Water Board staff** to post final meeting summaries of January and October Panel meetings by Tuesday, April 25, 5 pm.
3. **Center for Collaborative Policy (CCP)** to work with Water Board staff to develop a clear protocol and timeline for members of the public to provide input on agenda items for public meetings by Friday, April 28.
4. **David Ansolabehere** (Cawelo Water District) to update Water Board staff on garlic harvesting schedule and locations by Friday, April 28.
5. **CCP** to prepare draft meeting summary for Water Board staff and Panel member review by Friday, April 28.
6. **CCP** to revise Panel Charter with suggestions received by Panel members and the public by Friday, May 5. Revisions include:
 - a. Pagination
 - b. Clarification of Panel responsibilities in regards to anticipating future food safety conditions
 - c. Language describing standing agenda items (Project Status Update)
 - d. Edits to sections on Panel meeting schedule for consistency and clarity of expectations
 - e. Revised timeframe for posting meeting materials (one calendar week in advance of meetings)
7. **Water Board staff and Panel members** to review draft meeting summary and provide comments to CCP by Friday, May 5.
8. **CCP** to prepare final meeting summary by Tuesday, May 9.
9. **Water Board staff** to post the final Panel Charter by Tuesday, May 9.
10. **Water Board staff** to post the final meeting summary by Friday, May 12.
11. **Water Board staff** to provide a draft outline of the White Paper to Panel members by May 31.
12. **Water Board staff** to post draft outline of White Paper for the public to review one week in advance of the June public meeting.
13. **CCP** to work with Water Board staff and Panel members to set Panel schedule and determine Public meeting dates by Wednesday, May 3.

Introductions and Agenda Review

CCP facilitator Dave Ceppos opened the meeting with introductions from Food Safety Expert Panel (Panel) members, Water Board staff, and CCP staff. He reviewed the agenda, noting modifications to adjust for Panel member schedules. He emphasized that this was a working meeting of the Panel open to the public, not a traditional public meeting. As such, he explained that members of the public would have opportunities to comment on agenda items throughout the day but that deference would be initially given to the Panel members for discussion of each agenda item.

Materials list

The following items were posted on the Water Board's Oil Fields Food Safety [web page](#) and hard copies were made available to all participants.

1. [Meeting Agenda](#)
2. [Draft Charter](#) (revised)
3. [Central Valley Water Board March/April 2017 Fruit Sampling - Sampling and Analysis Plan](#) and [Attachment](#).
4. Central Valley Water Board March/April 2017 Fruit Sampling - Field Notes

Review of Previous Panel Meeting Summaries

Mr. Ceppos reviewed the process and timeline for preparing Panel meeting summaries. He explained that Panel and Water Board staff will receive a draft summary from CCP ten days after the meeting. Any feedback will be incorporated into a revised version. The public can expect to see a draft meeting summary posted to the website 3-4 weeks after a Panel meeting. The Panel will conduct final review and adoption of final meeting summaries at the subsequent public meeting. Water Board staff will post final summaries to the website once finalized.

Mr. Ceppos provided a summary of the action items from the January Panel meeting. He asked the Panel if there were any further revisions to the January Panel meeting summary. There were none. The Panel adopted the January meeting summary as final. He asked the Panel if there were any suggested revisions to the October meeting summary. There were none. The Panel adopted the October meeting summary as final.

Review and Discussion on Revised Panel Charter

Mr. Ceppos reviewed the purpose of the Charter. He explained the Charter confirms the purpose of the group, intended outcomes, roles and responsibilities of the different parties, and covers communication protocols. The Charter also outlines values, principles, and decision-making protocols. Mr. Ceppos emphasized the Panel is consensus-seeking, but not bound by a unanimous decision-making protocol. He asked the Panel members for comment.

Panel comments and questions

- The Charter appears to be open ended in terms of participation. The previous Charter indicated the Panel would convene for a year, which has already passed. What is the timeframe for the project?
 - Water Board: Time is of the essence. However, progress has been slow and it is unclear how long the overall Food Safety Project will take. The Water Board's intention is to move as quickly as possible, but investigate thoroughly.
- Panel member responsibility number six (p. 3) needs revision. Suggested language: "Evaluate short and long-term conditions related to food safety issues."

Mr. Ceppos asked Water Board staff for any additional comments on the Charter. There were none.

Public comments and questions

Mr. Ceppos asked the public to provide comment on the Charter.

- Bob Gore, The Gualco Group, Inc., representing the California Independent Petroleum Association (CIPA). There are a number of recent documents and reports coming out of the Governor's office, and in other legislative packages emphasizing the important of recycled water for long-term reliability of water supply. These documents recommend agricultural water management plans include recycled water. There are many reasonable beneficial uses of recycled water. We suggest the Charter include more detailed language on the greater environmental and legislative context for recycled water.
- Sue Chiang, Center for Environmental Health (CEH). I am glad to see additional details about the project in the revised Charter. I would like the Charter to specify that materials be posted at least a week in advance of public meetings rather than three days as currently written. We need sufficient time to review and comment. I also request that a current list of Panel members be posted on the website. I am glad to see the Charter includes details on the timely distribution of meeting summaries.
 - Ms. Chang asked for clarification on the scheduling of quarterly public meetings. Mr. Ceppos answered that public meetings will be scheduled as close to a quarterly schedule as reasonable. However, public meetings and working meetings also have to be scheduled in relation to the seasonal nature of crop sampling and turnaround time for chemical analysis. The intent of the Water Board is to hold regular public meetings to report back on project progress, which will not be fixed to a quarterly schedule but will ensure that public input happens early enough to potentially inform upcoming sampling work, and with enough time to prepare and present results from previous sampling efforts.
- Bill Allayaud, Environmental Working Group (EWG). With more discipline in the process now I hope to see more progress. The Charter outlines one of the project outcomes is a white paper. Is that still a reasonable goal or expectation? Also, the project purpose and scope says the Panel will focus on food safety issues at the point of harvest. I think the purpose of the Panel is to help the public understand food safety at the point of consumption. Everyone recognizes recycling water is a good thing. However, I do not want more context included in the Charter, because the fact is, recycling water also helps Chevron's bottom line. The Panel should focus on the conjunctive use, and not necessarily say recycling water is a good use.
- Keith Nakatani, Clean Water Action (CWA). I endorse comments made by Sue and Bill. I would like more clarity on the white paper, including the timeframe for producing it and what it will address. The previous Charter included a white paper as an outcome, and that was not produced in the timeframe outlined in the Charter. Also, I want to know how the public can provide input on the specificity of the paper. I am glad to hear the public meeting minutes will be made available, and I would like summaries from Panel member only meetings to be made available as well. Since Dr. Stringfellow is no longer on the Panel, I would like to discuss if he will be replaced by another member. I have suggestions for a replacement member. I would like to see a progress report on the project.

- Mr. Ceppos asked Mr. Nakatani to clarify his request for a progress report. Mr. Ceppos asked if including language in the Charter on a standing agenda item for a project status update—to be memorialized in the meeting summary—would address the request. Mr. Nakatani said that would be sufficient, if the postings continue to be timely. Water Board staff and Panel members agreed to include a project update standing agenda item in the Charter.
- Deb Wirkman, Santa Cruz. (Emailed comment during meeting.) Please do not include any reference to beneficial use of recycled water in the Charter as suggested by the petroleum industry representative in public comment. Please just stick to dealing with food safety, we all know about recycled water being a priority in California but we want it to be safe. Thank you.

Panel member and Water Board responses to public comment

Mr. Ceppos asked the Panel for reflections on the comments provided by the public.

- Regarding citations about water recycling in the Charter, Panel members highlighted that references to the topic already exist. One Panel member said they consider it a Water Board decision to insert additional background on recycled water. The Water Board said they did not think referencing more information about recycled water was a critical need.
- Dr. Karl Longley, Water Board Chair, highlighted that many things can happen between the point of harvest and the point of consumption. The latter requires looking further down the processing chain. We are only sampling in the field, at the point of harvest. Food outbreaks unrelated to produced water can occur in the processing chain—the handling and transportation sectors are also responsible for food safety. However, the Water Board's imperative is to determine the safety of what is coming out of the ground and fields.
- Clay Rodgers, Water Board, expressed it was appropriate for the Water Board to more clearly describe the white paper output. He said the white paper will document the outcomes of the Panel and describe Panel recommendations. He explained since Panel members are volunteers, Water Board staff has been tasked with assembling the white paper, which the Panel would review. Mr. Rodgers said the Water Board will put together an outline of the white paper to share with the public.
- Regarding adding new Panel members, Mr. Rodgers shared the Water Board has looked into doing so and is aware of requests/suggested members. He said there are no new members to date, but the Water Board is in consultation with a plant physiologist who would add expertise in the uptake and circulation of contaminants in plants, fruits, and nuts. Mr. Rodgers emphasized the Board wants to align the Panel's expertise with project needs. He said the Board is willing to consider recommendations from the public, but wants to maintain a smaller, workable number.
- Panel members and Mr. Rodgers agreed with Ms. Chiang that three days is not enough time to review meeting materials and that the Charter should specify materials be posted at least a week in advance.
- Mr. Rodgers said the Charter is correct now in terms of Panel composition. The Water Board will post the Charter online, so there will be a list of current Panel

members the public can access. He said the Water Board does not typically release individual contact info on their website. Panel members noted that many of them are public servants so their contact information is already publicly available. However, members agreed it might be useful for the Water Board to direct the public to the Panel member with the right expertise to address questions. Panel members and Water Board staff agreed that if people have questions, they can contact the Water Board directly and staff will forward the information to the relevant Panel member.

Mr. Ceppos said the facilitation team will incorporate recommendations by the Panel and the public. The Panel agreed to consider the next version of the Charter to be final.

Update on Food Safety Process Critical Path & Memorandum of Understanding

Mr. Ceppos reviewed the draft critical path and future public meeting dates. He explained that the Water Board conducted citrus sampling events in late March and early April, and will conduct subsequent samplings on summer crops. He said the goal is to schedule public meeting dates such that public discussions are early enough to gather input on upcoming sampling efforts, and also allow enough time for the analyses from most recent sampling efforts to be prepared and presented. Since sampling and analysis happens on a seasonal, not quarterly basis, meetings will be scheduled to accommodate these goals. The target windows for public meetings are late June and late October or early November. The Water Board will also convene Panel working meetings. Summaries of all meetings will be made available to the public.

Clay Rodgers, Water Board, gave an update on the memorandum of understanding (MOU). He said the MOU describes the relationship between the Water Board, dischargers, and users of produced water to address food safety issues. He said the involved parties are ready to sign the agreement, which will hopefully be by the week of April 28. The MOU will include attachments describing several tasks the Water Board has outlined to assess food safety. The first task is detailed literature review. The second addresses the hazardous nature of the chemicals (i.e. a chemical hazard assessment). The third addresses continued sampling, and includes the implementation of a sampling plan—expanded from citrus to other crops as needed. The Water Board's intention is to have scopes of work to discuss with the Panel at the next internal meeting in May.

Mr. Ceppos asked the Water Board to clarify when the Board will know which crops are being grown and irrigated with produced water. Mr. Rodgers responded that the Water Board already has a fairly accurate picture of what crops are currently being irrigated with produced water. However, there have been some recent changes. He explained the row crops that were irrigated with produced water have mainly been replaced with permanent nut crop plantings. Dale Harvey, Water Board, specified that the Water Board knows which crops are irrigated with produced water in Cawelo Water District (Cawelo), and the only row crop in Cawelo is garlic as far as they know. Garlic represents a very small proportion of the overall crop acreage irrigated with produced water.

Given public comments received, Mr. Ceppos asked the Water Board to address whether or not the list of crops being sampled for the food safety project would be made available to public. Mr. Harvey responded that if a member of the public wants to know more about specific crops, they can contact him directly.

Public comment

- Keith Nakatani, CWA. The proposed dates for public meetings sound reasonable, and I understand there are ongoing constraints. The overall timeframe is fine. It would be helpful to include in the current public meeting, the key items to be discussed at the subsequent public meeting and give the public the chance to suggest items as necessary. Regarding the list of crops being sampled, we understand things change and that there are logistical constraints on the transparency of the process. To the extent that things can be made more transparent, this will help with the public process. Putting the list of crops on the website is one such area of transparency. There has been some confusion about what crops are being irrigated with produced water. We want clarity on what is being sampled in Cawelo. I have been in contact with members of the public and they want root crops to be sampled. They also want the soil to be sampled.

Panel member and Water Board responses to public comment

One Panel member said that since meeting agendas typically include next steps already, and action items are recorded in the notes, the facilitation team could incorporate the suggestion to address subsequent meeting topics and query the public without much challenge. A Panel member said it seemed appropriate for the Water Board to share a list of crops currently irrigated with produced water on the website. In regards to the MOU, a Panel member suggested that the Panel think more broadly about the application of produced water on other crops. Since the Panel is reviewing food safety issues anyway, it might be useful not to constrain their thinking to only what is currently irrigated.

Science/Technical Advisor, Dr. William Stringfellow recommended the Water Board develop a standing agenda, to include the project status update and other items. He also suggested the Board develop a formal mechanism for public input on the agenda. Mr. Ceppos reminded everyone that not all items suggested by the public will necessarily be added to subsequent agendas and that said decision will be made by the Panel and Water Board. Water Board staff expressed they did not have any concerns about the suggestion.

Funding

Mr. Rodgers explained the purpose of the MOU is to secure funding for additional studies. Moving forward, it will be the responsibility of the produced water producers and irrigators to pay for the studies. Dr. Longley asked Mr. Rodgers to clarify some of the safeguards in the MOU. Mr. Rodgers explained that the State will not conduct the studies, nor contract with consultants directly due to the onerous State contracting process. Under the MOU, produced water producers and irrigators will contract with independent consultants to perform the studies. However, the Water Board retains the right of refusal in regard to choosing the consultant. The Board will also have technical control over contracted work. The Board will consult with the Panel on scopes of work. The produced water producers and irrigators will not provide input on the work to be

done. Mr. Rodgers explained the State Water Board Division of Water Rights uses a similar mechanism and arrangement when they need studies done in their area. He said the Water Board is taking this approach in order to secure funding, ensure technical and quality control over the project, and complete the work that needs to be done to assess food safety.

Update on Current and Upcoming Sampling Steps

Dr. Stringfellow presented on the March and April 2017 citrus sampling events. The full presentation can be found [here](#). He reviewed the objectives, which were to:

- Collect citrus samples from the current season
- Analyze samples for known chemicals of concern
- Archive samples for later study or repeat analysis
- Start process for independent monitoring and longer-term studies

He said the samples were archived (frozen) at University of the Pacific labs. Dr. Stringfellow reviewed the timeline for conducting the sampling events. The sampling team met with Cawelo staff and others to select sampling locations and gain permission to access the sites beforehand. He developed a sampling plan and specific collection protocols to determine what and why to measure. The sampling team collected samples on March 29, 30, and April 4. The sampling plan was based on the existing Cawelo Sampling and Analysis Plan (SAP) developed by Enviro-Tox Services, Inc., Cawelo's independent consultant. Dr. Stringfellow said he made minor modifications, partly due to the speed of the process. His team sampled locations where crops were irrigated with produced water as well as similar crop types not irrigated with produced water. He said his team was limited by landowner cooperation on property access. His team selected a variety of citrus types to sample, including Mandarin, Naval, and Valencia oranges, and lemons. He said Water Board staff accompanied the sampling team to observe what was done and provide an independent quality assurance. Samples were collected by the certified contract sampler or Water Board staff. In addition to Cawelo's certified contract sampler, LBNL staff collected samples in different containers and for archiving and later analysis.

Dr. Stringfellow reviewed the sampling plan. He said he still needs to address how to analyze and consider the peel, but for this analysis, the focus is on the edible portions of the fruit. He said the contract analysis includes a complete representative suite of contaminants of concern (COCs) in the petroleum industry (e.g., polycyclic aromatic hydrocarbons (PAHs), benzene, toluene, ethylbenzene and xylene (BTEX), and heavy metals). The analysis also includes compounds found in produced water such as methanol, acetone, and chloroform. He provided the list of organic analytes. These are compounds known to occur in oil and are on a few monitoring lists, e.g. EPA soil monitoring lists. He also provided a list of inorganic analytes. He said measuring metals can be costly. However, they decided to measure for all metals they could imagine potentially occurring. This list can be narrowed in the future depending on results.

Dr. Stringfellow reviewed the details of the sampling events. The team took samples from the middle of the groves to minimize any exposure from roads. They sampled 22 total locations, half in the treatment group (irrigated with produced water) and half in the control group. The samples represent a composite from at least three trees. He said for the control group locations they generally selected sites with common land owners and assumed similar agricultural practices.

Dr. Stringfellow said next steps include receiving the analytical results and developing the analysis report. He said he will interpret the results in the context of additional information about irrigation practices in the area. Also, he will develop a plan for future studies and monitoring.

Mr. Ceppos asked Dr. Stringfellow or the Water Board staff to describe the chain of custody and quality control measures taken by the sampling team. Dale Harvey responded that for the samples collected by the certified contract sampler, the contractor performed sample collection, placement in jars, and placement in a vehicle for transport. Water Board staff observed all tasks and followed the vehicle all day. Upon returning to Cawelo offices, the contractor signed the chain of custody forms and handed over the samples to the Water Board. Board staff then took the samples to FedEx and mailed them to the lab.

Questions from the Panel

All responses are from Dr. Stringfellow unless otherwise noted.

- When produced water is used for irrigation, is it used straight or always diluted with other sources?
 - Response: My understanding is that the water is always blended.
- Can you address naturally occurring radionuclides?
 - Response: The sample locations are in areas not generally subject to these radionuclides, but yes, we are looking into that.
- Has the lab doing the analysis, worked with citrus before? Do they have previous experience with citrus to compare results?
 - Response: Yes, they have prior experience with citrus. We are expecting a lot of interfering compounds. For PAHs, the lab is using selected ions. The lab will be running quality controls to determine the interfering compounds.
 - Follow up: The controls will help with that. I thought a lot of this water was already tested for heavy metals. You might consider shifting the money to the compounds most likely to be found later on.
 - Response: In the effort to be thorough, we used what we know about the oil and gas industry to determine the list of analytes. The current sampling on the irrigation water is representative, but is not necessarily frequent enough to be complete, so we decided not to limit the analysis to the chemicals found in the irrigation water. We will potentially reduce the list later on.

- How will you determine representativeness?
 - Response: We need to keep revisiting the representativeness issue. There is a lot of acreage planted. I think these are representative samples for what is happening in these groves. Another issue is landowner cooperation, which impacts where we can sample. As we interpret the data, we can make more independent assessments of representativeness. For the MOU, I am suggesting detailed scientific studies on areas that have been more heavily watered with produced water. We do not have the budget to sample everywhere but want to have a robust monitoring program.
- Is the mesocarp (pith) being included in the edible portion or not?
 - Response: We believe the mesocarp is included in the analysis but will verify as soon as reasonably possible.
- How does the previous work Dr. Shonkoff has done on chemical additives and COCs, fit in here?
 - Response: In terms of chemical additives, we did not want to do an analysis that we could not interpret well. With the MOU scopes, we want to complete the analysis and generate a list of compounds that seem most important. Some compounds may be measurable using certified procedures, but for others, protocols and procedures may need to be developed. That is part of the research objective. We have yet to establish appropriate analytical methods for some of these constituents.
- There are holding time issues with some of the analytical methods you are using. Will this undergo data validation?
 - Response: We are aware of the holding time issues. We have frozen the samples for now. I want to use those samples for methods development. Any analysis of the archived samples will not be legally binding. The immediate samples will undergo data validation.
- Can you provide more detail on how you chose where to sample, particularly in relation to the relative size of the fields and the number of samples taken?
 - Response: We considered several approaches, one being a zig-zag pattern. We tried to control one important parameter, that being exposure to road contaminants. We have not adequately addressed the size of the fields. We sampled in such a way as to avoid edge effects.
 - Follow up: This impacts representativeness. For example, if one sample is appropriate for ten acres, is ten samples appropriate for 100 acres.
- At what temperature did you store the frozen samples?
 - Response: They are in a regular freezer, so -14 degrees C.
- Will o-, m-, and p-xylene capture total xylene?
 - Response: Yes.
- I recommend you use the same containers.
 - Response: I was trying to see if there was a container effect. We used glass, metal, and plastic containers, which were all treated with the same acid wash, except the metal containers. Those are an experiment.

- Were any of the samples composited?
 - Response: At the lab they will composite the sample from the whole grove, which could include multiple trees.
- There are plants that may not be major commodity products but are avid accumulators of heavy metals. Have you considered this? For example, sunflower seeds are avid accumulators of cadmium
 - Response: There is an active debate about the scope of the studies. We have not discussed sampling other plants. We have discussed sampling soils.
 - Panel member comment: Sunflowers are not currently irrigated with produced water as far as we know.
- Do you know which crop is the next priority to test? From a risk assessment perspective, it might be good to look at root crops.
 - Response: The plan is to measure all crops that are being watered with produced water. Next crop in season is grapes. In terms of root crops, we still need to address outside contamination issues in preparing samples. We want to analyze the whole fruit, but we need to clean it for sampling. The fruit travels a large processing chain before reaching the consumer, which we need to consider.
- Usually it is cost prohibitive to get a statistically significant sample. Who funded this sampling? What was the cost for the analytical results?
- Water Board: We received \$250,000 from the State from oilfield contract monies. The State thought it was commendable that Cawelo had done voluntary sampling but felt the need to assume oversight and control to ensure public confidence. However, we encountered contracting issues with LBNL to pay for the analysis. Cawelo stepped up to pay for the samples and analytical work at Weck Laboratories. The reports will come to the Water Board. For the samples collected outside of Cawelo, we are using discretionary funding from our Fresno office's contract lab. The contract lab is subcontracting the additional analysis to Weck. I think we are going to spend \$5,000 to \$7,000 for analysis of samples outside of Cawelo. Cawelo is paying around \$35,000. For 22 samples we are talking about \$40,000 to \$45,000. We are grateful to Cawelo for providing resources to help perform this sampling.

Panel members also discussed other issues to consider, such as how much total acreage of a particular crop is grown in relation to the acreage irrigated with produced water. Panel members said there is talk of expanding this practice outside of California, and while not the Panel's charge, worst-case scenarios are something to consider with the resources we have. Mr. Ceppos commented that the issue of best management practices is something that has been raised for Panel members to potentially address in the longer-term.

Public comment

- Sue Chiang, CEH. I am glad to see there is an expanded list of chemicals. There are still quite a few that were identified in an earlier report from last year. However, over forty percent of the chemicals remain unidentified. The fact that we do not know what chemicals are in the water continues to be a problem. We are concerned about root crops because of soil contact. Are there good irrigation records for the fields being sampled, i.e. what kind of water has been applied to the fields historically, and was that information taken into account?

Ideally there would be one consistent party doing the sampling—an independent third-party sampler. Are the sampling logs going to be made publically available? We did not have a lot of time to look through all of this. Also, people do use rinds for different purposes—will the sampled rinds be saved and looked at in the future?

- Dr. Stringfellow: In regard to other chemicals involved. Under the MOU, we will complete the initial hazardous compounds assessment and create a more complete target list. We have to consider which COCs are likely to persist in the environment. We also need to consider if we have good analysis methods for the COC. It is expensive to develop methods, and we need to have reason to develop methods. The list will be expanded as necessary over the course of the investigation. There are irrigation records, which we will obtain and analyze. The irrigation record is part of the methods development. We currently depend on Cawelo for that information. We want to engage independent parties to help verify the information and build confidence in the process. There is a process for obtaining information about trade secrets, but it is complicated and takes time. I agree it is important to have established protocols for sampling. We currently use a certified sampling entity, The Water Board oversees sampling events. We are trying to make sure the sample container is consistent with what we are trying to analyze. In regard to data access, field notes are typically included in the reports we put out.
- Keith Nakatani, CWA. We appreciate that this sampling plan includes more chemicals. However, there are still COCs that are not being addressed, which represents a huge gap. If we do not know what the chemicals are, how will we know if the food is safe? It seems important to assess fields that have been irrigated for a long time, maybe less so for those that are more recently irrigated. Is this standard wastewater irrigation (or more or less highly diluted)? My understanding is that there are ongoing studies. We believe root crop sampling is important, especially with regard to potential expansion of this practice. Are there plans to conduct soil sampling? This is important. I would like to know more about the literature review and hazard assessment.
 - Response: Yes, we are going to look at the water use history of different areas, and that is important.
- Bill Allayaud, EWG. Boron is not listed. There is no maximum contaminant level for this element. This chemical of concern was found in Kern County. I suggest you test for this.
 - Water Board: We currently monitor for boron. This element is more common in marine oilfields, where levels can be high. Boron levels are generally not very high in freshwater oilfield zones. The Water Board has a strict boron maximum for irrigation water because at higher concentrations it negatively affects plants. We do not see this element as a food safety concern since we already maintain low boron levels for agricultural purposes.

- Bill Allayaud, continued: I would like to know how Water Board intends to safeguard against intentional dilutions. I want to see a clear, neutral, and objective methodology.
 - Water Board: We will definitely look into any striking differences in the analysis results across sites. However, we intentionally chose to sample fields that we know received the most produced water over time and in the highest concentrations.
 - Dr. Stringfellow: We operate under a position of trust and verify.
- David Ansolabehere, General Manager, Cawelo Water District, answered several questions raised by members of the public. He explained that all water that comes into Cawelo goes to the main reservoirs, is blended, and sent out through the main distribution system. He emphasized there is no way to not commingle the surface waters and the produced waters. He said Cawelo has been doing voluntary testing for two years. They have used the same third party consultant for all testing. He said Cawelo wanted to make sure there was no question about who was handling the fruit samples. He explained they received the reports and critiqued them each time to improve the testing, so what they do now is the final result of our sampling over the years. He said Cawelo did sample root crops last year. Farmers primarily grow citrus in Cawelo, but there were about 400 acres of carrots and potatoes. Cawelo submitted the report on row crops to the Water Board and Expert Panel 8 months ago. He said the majority of row crops were replaced with pistachios and other permanent crops. There may be root crops planted in Cawelo this year, but we do not know yet. He explained all the fruit trees have been irrigated with the blended water. The only other water source is groundwater. Mr. Ansolabehere also said Cawelo has been monitoring boron and salts since the 1990s. Cawelo maintains boron levels at 0.5 milligrams/liter for the citrus growers, since citrus trees are sensitive to boron. Pistachios growers add boron to the water since pistachios need boron to grow. Mr. Ansolabehere said he thinks Dr. Stringfellow and his team will be able to access root crops for sampling, and clarified to members of the public that Cawelo operators are in charge of blending the water.
 - Mr. Allayaud asked Mr. Ansolabehere to explain what walnut shell filters are. Mr. Ansolabehere said walnut shell filters are used within Chevron's facilities to remove particulate matter and other materials. After being filtered, water is sent to a polishing pond, where any remaining oil settles on the surface of the water and is absorbed by materials. The water is gravity fed and blended with other waters for distribution.

Next Steps

Mr. Rodgers addressed next steps. These include expanding the scopes of tasks 1 and 2 (the literature review and hazard assessment). The Water Board will provide these tasks to MOU partners with a cost estimate. Alongside the MOU efforts, Dr. Stringfellow will develop a long-term sampling plan to be attached to the MOU. Mr. Rodgers said the Water Board is funding the work of the technical advisor with the available resources from the State. The long-term sampling plan will take several months to develop. However, the Water Board wants to select a contractor by July 1 to implement the sampling protocol on the next crop (grapes). He said nut crops are typically harvested in September and October, and that the Board will get more information on the harvest schedule for garlic.

Discussion on the timeline for completion of Task 1 (Literature Review)

Dr. Longley asked for an update on the literature review task. Mr. Rodgers explained they are working on it but have not set a deadline for the final product. Completing the literature review also requires a clear understanding of the scope of the project. Mr. Rodgers said there is a monitoring approach as the crops ripen, but the Water Board also wants a larger study in the context of food safety of produced water. One Panel member emphasized the need to conduct a thorough literature review to determine what the COCs are and should be. He said the Water Board should use resources carefully and draw defensible conclusions from scientific investigation. He suggested expanding the scope to include environmental sampling, particularly soils.

Dr. Stringfellow commented that they received good feedback from the public about root crops. He said the sooner the Water Board and Panel can decide on what is important and representative, then the fieldwork can happen. He expressed his approach would be too narrow in on a few case studies but describe the overall context, so the public understands how everything fits together. He expressed interest in having a solid literature review draft before the summer grape sampling. He said there should be input from the Panel and the public on the literature review. Mr. Ceppos suggested the Water Board clarify who is responsible for completing the literature review and by when. Water Board staff agreed to hold an internal conversation to determine when literature review will be completed.

Discussion on long-term study issues

Science /technical advisor and Panel members discussed outstanding questions and issues, which include:

- How to ensure handling protocols realistically reflect how a consumer will likely receive a food product?
- Standard fruit cleaning protocols—how will fruit samples be processed in the lab?
- How to determine sampling sites
- What to sample—just fruit or other components

Dr. Stringfellow emphasized the need to address the handling of external contaminants. While there are standard lab handling procedures, those need to be looked in relation to how people actually consume the food products. He said the public should have the opportunity to provide input on a reasonable lab handling protocol. Moving forward, Dr. Stringfellow explained that he will edit and revise the sampling plan, circulate it to the Panel for initial input, and then the Water Board will present it to the public for review.

One Panel member commented that grape growers sample frequently and have existing processing protocols in place. He said one external contaminant issue for field grapes might be sulfur. Another Panel member highlighted the large number of potential variables to address, including the timing of sulfur applications, rain, and diverse farming practices. Dr. Stringfellow reiterated the value of focusing on smaller region to narrow the variables.

Mr. Rodgers clarified the Water Board is moving forward with a parallel and interrelated process. This includes a sampling protocol and work plan outlined under the MOU in addition to a literature review and hazard assessment. He said the intention is to

conduct summer crop sampling under the MOU. Dr. Stringfellow emphasized the importance of developing and reviewing a sampling protocol before hiring a contractor. Panel members said a parallel process seems appropriate for addressing initial concerns, but is not a good idea for the long-term.

Public Comment

Water Board staff read aloud public comments received by email. Mr. Ceppos invited members of the public to present verbal comments as well.

- Justin Bass, Freelance Reporter. Is there a cancer study on people who eat food grown with oilfield wastewater for 10 years? Will the members of the Food Safety Panel volunteer to eat a steady diet of food grown with oilfield wastewater for the next 10 years as part of an epidemiological study?
 - Bruce Macler volunteered.
- Laura Rosenberger Haider.
 - Did you contact an expert on food safety, Dr. Mike Adams, Director of CWC Labs, which tests food for metals in fracking wastewater such as lead and arsenic?
 - No, the Water Board is not familiar with Dr. Adams.
 - Several scientists have a theory that when toxic burden reaches a certain level, toxins get past the immune system and are likely to cause cancer. The American Cancer Institute or Society predicted that 1 in 3 women and 1 in 2 men in the U.S. will get cancer in their lifetime which implies that a lot of people's toxic burden will exceed the maximum level for health. Several pollutants accumulate. About ten carcinogenic chemicals are found in fracking wastewater. The cancer rate could even bankrupt health insurance companies, adding this additional risk factor. Also, the increased rate of early onset Alzheimer's and autism and other autoimmune partially linked to toxic metals could impair scientist's ability to respond to the threat. Will provide references from my studies of integrative medicine later. Some of the minerals in fracking wastewater compete with beneficial minerals needed for the immune system to function, while the beneficial minerals in food crops are declining over time partially due to depletion and glyphosate. Then there is the inability to afford enough nutrition due to economic decline partially from bad investments of our government in promoting companies proven guilty of crimes against humanity that are being boycotted. The money spent on war will bring climate change and food polluted from war. There is no guaranteed right to clean water and vitamins. Investments were made in pharmaceutical medicines that often deplete vitamins and decrease the immune system.
- Deb Wirkman, Santa Cruz.
 - How can the public find out what crops and other agricultural products are being irrigated with the produced water that is the subject of study of this Panel?

- Are any organic crops or other organic agricultural products being irrigated with the water that is the subject of study of this Panel? If so, where can the public find a list of these products and any other consumer information available about these products?
 - Will livestock irrigated by produced water be studied by this Panel?
 - Will all root crops and row crops irrigated by the produced water be studied by this Panel? If not, how will crops be selected/excluded from study?
 - Will radionuclides in agricultural produce irrigated by produced water be studied? What about mercury?
 - Please ensure that sample collection, storage and preparation procedures are carefully designed and carried out to preserve any contaminants that may be present that could be consumed.
- Jacquelyn Griffith, Santa Cruz. Please do not approve oilfield wastewater for use on any agricultural crops that will feed people or animals that will be consumed by people. I am deeply concerned because I have read many studies that show that plants do take up the chemicals in the soil and water. We have many growing health and educability problems. Some we understand, but many we do not. Even trace chemical amounts can have great impact (for example: endocrine disrupters), and repeated exposures in our foods and over time often build up. Our studies and records are so incomplete! I know this is true, because of my own personal experience with synthetic chemicals and illness. I would be happy to speak with anyone on your Expert Panel and to answer any questions.
- Mary Kay Benson. Do you think it is legal and moral to poison the food and water supply in CA harming the people so big Oil/Gas, Big Agra and Big Chem can make more short- term profits? If you won't stop this insane practice, would you at least make labeling of such mandatory?
- Bill Allayaud. People are concerned about body burden, not just dosage. We need to look at parts per billion impacts. I appreciate Cawelo's cooperation. The Water Board needs to look at water in Kern and North Tulare. Why not start a test plot in the newly irrigated areas to show the public what might be happening. This past year there was more rainwater, which may have diluted the impact. We emphasize the root crops for obvious reasons. There is a concern of repeated consumption.
- Keith Nakatani. Many of us are aware of another study being done on oilfield produced water led by researchers from Duke University. I suggest the Water Board and Panel coordinate as much as possible with this team.
 - Dr. Stringfellow said he has been in contact with the research team from Duke and is waiting to hear more from them regarding their study.

In response to public comments, one Panel member agreed that studying livestock receiving produced water is important. Water Board staff and the Science Advisor reiterated the focus on Cawelo is because of its history of receiving produced water. There are other sites as well, but with limited funding, the focus has been on longer-term areas.

Agenda for next public meeting

Mr. Ceppos reviewed several items to be included on the agenda for the next public meeting in June. These include reviewing the draft sampling plan, updating the public on the status of the Food Safety Project, and sharing any updates on coordination with the produced water study being led by Duke University researchers.

Closing Remarks

Dr. Longley, Water Board, expressed hope for moving the process forward. He said this has evolved into a more comprehensive project than we had anticipated. He thanked members of the Panel and the public for their comments, and Cawelo for their participation. Mr. Ceppos adjourned the meeting.